

What is claimed is:

1. A UPS system employing a back-up power system for supplying electrical power to a load when power from an AC power source is performing outside of acceptable limits or fails comprising, in combination

a power control circuit, including a UPS processor, for coupling to an AC power source and to a back-up power system including one or more battery packs coupled together in parallel for supplying power to a load when an AC power source is performing outside acceptable limits or fails and a battery communication system including, in combination with the UPS processor,

a plurality of battery pack monitors, one monitor being associated with one battery pack in the parallel coupled array of one or more battery packs,

each monitor including a battery processor coupled to its associated battery pack for receiving, processing and storing battery pack information and

a communication lead line coupled to the UPS processor and the monitor processors for transmission of battery pack information among the monitor processors and the UPS processor.

2. The UPS system of claim 1 wherein the transmission of battery pack information from a monitor processor to the UPS processor occurs in response to a command issued by the UPS processor to a monitor processor.

3. The UPS system of claim 1 wherein each monitor includes an alarm for identifying to users of the system that a battery pack associated with a monitor requires service.

4. The UPS system of claim 3 wherein the alarm includes a light emitting diode ("LED").

1 5. The UPS system of claim 1 wherein each monitor further
2 includes a power supply for generating voltages for monitor
3 electrical components including the monitor processor
4 wherein the power source for the monitor power supply is a
5 battery pack and further including a connector for coupling
6 to a battery pack.

1 6. The UPS system of claim 1 wherein the communication
2 system extends from the UPS processor to each monitor
3 processor associated with a battery pack in the array of
4 parallel coupled battery packs.

1 7. The UPS system of claim 6 wherein each monitor
2 processor that receives a command from the UPS processor
3 transmits battery pack information over the lead line to the
4 UPS processor.

1 8. The UPS system of claim 6 wherein the communication
2 system includes

3 a lead line coupled between the UPS processor and the
4 first monitor processor, between the first and second
5 monitor processors and between all remaining processors out
6 to the last monitor processor and wherein

7 the UPS processor transmits commands to each monitor
8 processor associated with a battery pack and

9 each monitor processor associated with a battery pack
10 transmits battery information to the UPS processor in
11 response to receipt of a command.

1 9. The UPS system of claim 1 wherein the communication
2 system includes

3 a command lead line coupled from the UPS processor to a
4 first monitor processor and coupled between the first and a
5 second monitor processor and between remaining monitor

6 processors associated with a battery pack in the array of
7 parallel battery packs,

8 a data lead line coupled from the UPS processor to a
9 first monitor processor and coupled between the first and a
10 second monitor processor and between the remaining monitor
11 processors associated with a battery pack in the array of
12 parallel battery packs,
13 and wherein

14 the UPS processor transmits a command to each monitor
15 processor over the command lead lines directly or through
16 other monitor processors coupled to the command lead lines
17 and

18 each monitor processor transmits battery pack
19 information to the UPS processor over the data lead lines,
20 in response to receipt of a command from the UPS processor
21 either directly or through other monitor processors coupled
22 to the data lead lines.

10. The UPS system of claim 1 wherein the battery pack
information transmitted to the UPS processor includes
information that a battery pack associated with a monitor
requires service.

11. The UPS system of claim 1 wherein the battery pack
information transmitted to the Ups processor includes
information that a battery pack has experienced charging.

12. The UPS system of claim 1 wherein the battery pack
information transmitted to the UPS processor includes
information that a battery pack has been determined to be
early good.

13. The UPS system of claim 1 wherein the battery pack
information transmitted to the UPS processor includes
information that a battery pack is at or near float voltage.

1 14. The UPS system of claim 1 wherein the battery pack
2 information transmitted to the UPS processor includes
3 information that a battery pack is over an acceptable
4 temperature.

1 15. The UPS system of claim 1 wherein the battery pack
2 information transmitted to the UPS processor includes
3 information that a battery pack is a large battery.

1 16. The UPS system of claim 9 wherein the command and data
2 lead lines include four wire, telephone handset lead
3 terminated at each end with a four pin RJ-22 telephone
4 handset connector.

1 17. The UPS system of claim 1 wherein the monitor
2 processors are coupled to an associated battery pack to
3 receive, process and store battery charging and discharging
4 current and voltage data.

1 18. The UPS system of claim 1 wherein each monitor further
2 includes an LED alarm and wherein the monitor processors are
3 further coupled to an associated battery to receive, process
4 and store battery charging and discharging current data and
5 voltage data to generate information indicating that the
6 battery requires service and for turning on an LED alarm to
7 identify to users of the UPS system that a particular
8 battery pack in the parallel array requires service.

1 19. The UPS system of claim 1 further including an LCD
2 display coupled to the UPS processor and wherein the monitor
3 processors transmit information relating to a battery pack
4 for viewing on the LCD display.

1 20. The UPS system of claim 1 wherein the monitor
2 processors are further coupled to a temperature sensor to
3 receive, process and store battery temperature information.

1 21. The UPS system of claim 20 wherein the battery
2 temperature data is processed by a battery monitor to
3 produce battery pack temperate information for transmission
4 to the UPS processor indicating that a battery pack
5 temperature has exceeded a recommended level.

1 22. The UPS system of claim 1 wherein each monitor
2 processor calculates ampere hour information on its
3 associated battery pack and uses the information to
4 determine an early good condition for the battery pack.

23. The UPS system of claim 22 herein each monitor
processor further uses calculated ampere hours information
to determine whether its associated battery pack requires
service.

ADD
C1

ADD
D4